

# GEOMETRY



## Final Exam Study Guide *Spring 2012*

Mrs. Sharkey

### **Mission Statement:**

Northern Vance High School strives to prepare 21<sup>st</sup> Century future-ready students to be innovative, creative, self-motivated, and globally competitive who will pursue a post-secondary education and who will become life-long learners.

### **Vision Statement:**

R.E.A.L.  
Raise Everyone's  
Achievement Level

## Geometry Final Exam Review 1-5, and Similarity

## Multiple Choice

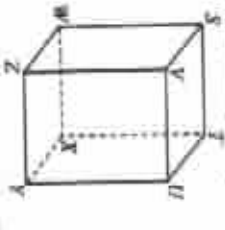
Identify the choice that best completes the statement or answers the question.

1. Find a counterexample to show that the conjecture is false.  
Conjecture: Any number that is divisible by 4 is also divisible by 8.  
a. 24      b. 40      c. 12      d. 26
2. Find a counterexample to show that the conjecture is false.  
Conjecture: The product of two positive numbers is greater than the sum of the two numbers.  
a. 1 and 5  
b. 2 and 2  
c. A counterexample exists, but it is not shown above.  
d. There is no counterexample. The conjecture is true.
3. Are points R, J, and C collinear or noncollinear?



- a. collinear      b. noncollinear      c. impossible to tell

4. Name a fourth point in plane TUVW.



- a. J      b. Z      c. W      d. X

5. If  $EF = 2x - 12$ ,  $FG = 3x - 13$ , and  $EG = 21$ , find the values of  $x$ ,  $EF$ , and  $FG$ . The drawing is not to scale.



- a.  $x = 10$ ,  $EF = 8$ ,  $FG = 13$   
b.  $x = 3$ ,  $EF = 6$ ,  $FG = 6$   
c.  $x = 10$ ,  $EF = 12$ ,  $FG = 8.5$   
d.  $x = 3$ ,  $EF = 8$ ,  $FG = 13$

6. If  $m\angle MOC = 27^\circ$  and  $m\angle MON = 47^\circ$ , then what is the measure of  $\angle MOP$ ? The diagram is not to scale.



- a. 74      b. 40      c. 20      d. 54

7.  $\angle HPQ$  and  $\angle JKL$  are complementary angles.  $m\angle HPQ = x + 5$ , and  $m\angle JKL = x - 9$ . Find the measure of each angle.

- a.  $\angle HPQ = 47^\circ$ ,  $\angle JKL = 51^\circ$   
b.  $\angle HPQ = 47^\circ$ ,  $\angle JKL = 41^\circ$   
c.  $\angle HPQ = 52^\circ$ ,  $\angle JKL = 48^\circ$   
d.  $\angle HPQ = 52^\circ$ ,  $\angle JKL = 38^\circ$

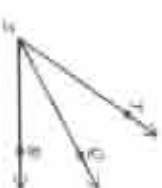
8. If  $\angle A$  and  $\angle B$  are supplementary angles and  $m\angle A = 4m - 8$ , find  $m\angle A$  and  $m\angle B$ .  
a.  $72^\circ$ ,  $18^\circ$       b.  $144^\circ$ ,  $36^\circ$       c.  $18^\circ$ ,  $72^\circ$       d.  $56^\circ$ ,  $144^\circ$

9.  $\overleftrightarrow{MH}$  bisects  $\angle LMN$ ,  $m\angle LMH = 8x - 73$ , and  $m\angle HMO = 2x + 37$ . Solve for  $x$  and find  $m\angle LMN$ . The diagram is not to scale.




- a.  $x = 9$ ,  $m\angle LMN = 90$   
b.  $x = 9$ ,  $m\angle LMN = 40$   
c.  $x = 10$ ,  $m\angle LMN = 114$   
d.  $x = 10$ ,  $m\angle LMN = 57$

10.  $\overleftrightarrow{AC}$  bisects  $\angle ECT$ , and  $m\angle ACG = 2x - 9$ . Write an expression for  $\angle ECT$ . The diagram is not to scale.



- a.  $6x - 9$       b.  $6x - 18$       c.  $3x - 9$       d.  $1.5x - 4.5$

11. The Friendship Train has routes from Friendship Mall through the City Center to Seafarmer Tooth Park. The mall is 3 miles west and 2 miles south of the City Center. Tooth Park is 4 miles east and 5 miles south of the Center. How far is it from Tooth Park to the Mall to the nearest tenth of a mile?
- 9.9 miles
  - 3.6 miles
  - 3.2 miles
  - 6.4 miles
12.  $M$  is the midpoint of  $\overline{CP}$  for the points  $C(1, 4)$  and  $P(9, 8)$ . Find  $MP$ .
- $\sqrt{13}$
  - $2\sqrt{13}$
  - 56
  - 13
13. Write the statement as a conditional in  $if-then$  form:  
All triangles have three sides.
- If a triangle has three sides, then all triangles have three sides.
  - If a figure has three sides, then it is not a triangle.
  - If a figure is a triangle, then all triangles have three sides.
  - If a figure is a triangle, then it has three sides.
14. Which conditional has the same truth value as its converse?
- If  $x = 7$ , then  $|x| = 7$ .
  - If a figure is a square, then it has four sides.
  - If  $x - 17 = 4$ , then  $x = 21$ .
  - If an angle has measure 10, then it is acute.
15. For the following true conditional statement, write the converse. If the converse is also true, combine the statements as a biconditional.  
If  $x = 1$ , then  $x^2 = 9$ .
- If  $x^2 = 9$ , then  $x = 1$ . True;  $x^2 = 9$  if and only if  $x = 1$
  - If  $x^2 = 1$ , then  $x = 9$ . False
  - If  $x^2 = 9$ , then  $x = 1$ . True;  $x = 1$  if and only if  $x^2 = 9$
  - If  $x^2 = 9$ , then  $x = 1$ . False
16. Use the Law of Detachment to draw a conclusion from the two given statements.  
If two angles are congruent, then they have equal measure.  
 $\angle P$  and  $\angle Q$  are congruent.
- $m\angle P + m\angle Q = 90$
  - $m\angle P = m\angle Q$
  - $\angle P$  is the complement of  $\angle Q$
  - $m\angle P = m\angle Q$
17. Use the Law of Attachment to draw a conclusion from the two given statements. If not possible, write not possible.  
I can go to the concert if I am allowed to buy a ticket.  
I can go to the concert.
- I am allowed to buy a ticket.
  - I cannot afford to buy the ticket.
  - If I can go to the concert, I can afford the ticket.
  - not possible

18. Which statement is the Law of Detachment?
- If  $p \rightarrow q$  is a true statement and  $q$  is true, then  $p$  is true.
  - If  $p \rightarrow q$  is a true statement and  $q$  is true, then  $q \rightarrow p$  is true.
  - If  $p \rightarrow q$  and  $q \rightarrow r$  are true, then  $p \rightarrow r$  is a true statement.
  - If  $p \rightarrow q$  is a true statement and  $p$  is true, then  $q$  is true.
19. Use the Law of Detachment and the Law of Syllogism to draw a conclusion from the three given statements.  
If an elephant weighs more than 2,000 pounds, then it weighs more than Jill's car.  
If something weighs more than Jill's car, then it is too heavy for the bridge.  
Sentry the Elephant weighs 2,150 pounds.
- Sentry is too heavy for the bridge.
  - Sentry weighs more than Jill's car.
  - If Sentry weighs more than 2,000 pounds, then Sentry is too heavy for the bridge.
  - If Sentry weighs more than Jill's car, then Sentry is too heavy for the bridge.
- Fill in each missing reason.**
20. Given:  $m\angle QRB = x - 4$ ,  $m\angle QRB = x - 11$ , and  $m\angle QRS = 100$ .  
Find  $x$ .
- 
- Choosing not to solve
- $$m\angle QRB = m\angle QRB = m\angle QRS$$
- $x - 3 + x - 11 = 100$
  - $2x - 16 = 100$
  - $2x = 116$
  - $x = 58$
- \_\_\_\_\_
  - Substitution Property
  - Simplify
  - Division Property of Equality
21. Name the property or properties that justify the statement.  
If  $XY \cong WX$ , then  $WX \cong XY$
- Symmetric Property
  - Transitive Property
  - Reflexive Property
  - none of these

22. Name the Property of Congruence that justifies the statement:  
If  $\angle A \cong \angle B$  and  $\angle B \cong \angle C$ , then  $\angle A \cong \angle C$ .
- Transitive Property
  - Symmetric Property
  - Reflexive Property
  - none of these

Use the given property to complete the statement.

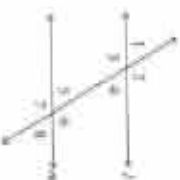
23. Transitive Property of Congruence:  
If  $\angle D \cong \angle F$  and  $\angle F \cong \angle H$ , then \_\_\_\_.
- $\angle F \cong \angle H$
  - $\angle F \cong \angle D$
  - $\angle D \cong \angle H$
  - $\angle D \cong \angle F$
24.  $\overline{ED}$  bisects  $\angle ADE$ ,  $m\angle ADE = 7x$ ,  $m\angle AED = 3x + 25$ . Find  $m\angle ADE$ .
- 90
  - 125
  - 75
  - 175

25. Find the values of  $x$  and  $y$ .



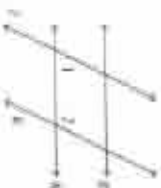
(showing work on side)

- $x = 45$ ,  $y = 17$
  - $x = 112$ ,  $y = 68$
  - $x = 68$ ,  $y = 112$
  - $x = 17$ ,  $y = 45$
26. Find the value of the variable if  $\ell \parallel k$ ,  $m\angle 1 = 3x + 44$  and  $m\angle 5 = 3x + 38$ . The diagram is not to scale.



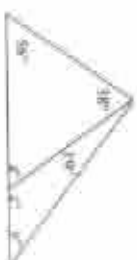
- 1
  - 2
  - 7
  - 2
27. Complete the statement: If a transversal intersects two parallel lines, then \_\_\_\_ angles are supplementary.
- acute
  - obtuse
  - corresponding
  - alternate interior

28. Which line, if any, can you conclude are parallel given that  $m\angle 1 = m\angle 2 = 180^\circ$ ? Justify your conclusion with a theorem or postulate.



- $l \parallel k$ , by the Converse of the Same-Side Interior Angles Theorem
- $l \parallel k$ , by the Converse of the Alternate Interior Angles Theorem
- $l \parallel k$ , by the Converse of the Alternate Exterior Angles Theorem
- $l \parallel k$ , by the Converse of the Same-Side Exterior Angles Theorem

29. Find the values of  $x$ ,  $y$ , and  $z$ . The diagram is not to scale.



- $x = 30$ ,  $y = 94$ ,  $z = 67$
  - $x = 67$ ,  $y = 86$ ,  $z = 94$
  - $x = 67$ ,  $y = 94$ ,  $z = 86$
  - $x = 86$ ,  $y = 67$ ,  $z = 94$
30. The irregular polygon has angles whose measures are in the ratio 8 : 3 : 9. What is the measure of the smallest angle?
- 27
  - 3
  - 30
  - 36
31. How many sides does a regular polygon have if each exterior angle measures  $20^\circ$ ?
- 17 sides
  - 20 sides
  - 21 sides
  - 18 sides
32. Find the missing angle measure. The diagram is not to scale.

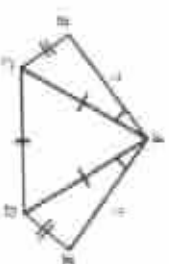


- $x = 124$ ,  $y = 125$
- $x = 56$ ,  $y = 134$
- $x = 134$ ,  $y = 56$
- $x = 56$ ,  $y = 124$

33. Write an equation for the line perpendicular to  $y = 2x - 3$  that contains  $C(9, 6)$ .

- a.  $y - 6 = -2(x + 9)$       e.  $y - 6 = -\frac{1}{2}(x + 6)$   
 b.  $x - 6 = -2(y + 9)$       f.  $y - 6 = -\frac{1}{2}(x + 9)$

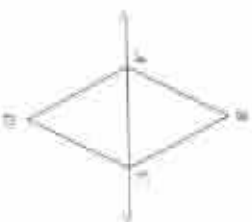
34. State whether  $\triangle ABC$  and  $\triangle DEF$  are congruent. Justify your answer.



- a. yes, by either SSS or SAS  
 b. yes, by SSS only  
 c. yes, by SAS only  
 d. No, there is not enough information to conclude that the triangles are congruent.

35. What is the missing reason in the two-column proof?

Given:  $\overleftrightarrow{AC}$  bisects  $\angle EAB$  and  $\overleftrightarrow{CA}$  bisects  $\angle DCB$   
 Prove:  $\triangle DAC \cong \triangle ABC$



Statements

1.  $\overleftrightarrow{AC}$  bisects  $\angle EAB$
2.  $\angle DAC \cong \angle BAC$
3.  $\overleftrightarrow{AC}$  bisects  $\angle DCB$
4.  $\angle BCA \cong \angle ACD$
5.  $\angle DAC \cong \angle BCA$
6.  $\triangle DAC \cong \triangle ABC$

- a. ASA Postulate  
 b. SSS Postulate

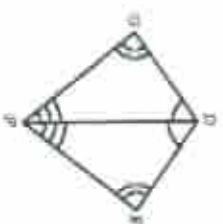
Reasons

1. Given
2. Definition of angle bisector
3. Reflexive property
4. Given
5. Definition of angle bisector
6. ?

- c. SAS Postulate  
 d. AAS Theorem

7.

36. From the information in the diagram, can you prove  $\triangle FDC \cong \triangle FDE$ ? Explain.



- a. yes, by ASA  
 b. yes, by AAS

- c. yes, by SAS  
 d. no

37. Based on the given information, what can you conclude, and why?

Given:  $\angle F \cong \angle L$ ,  $\overline{FD} \cong \overline{LE}$



- a.  $\triangle FDE \cong \triangle LDE$  by ASA  
 b.  $\triangle FDE \cong \triangle LDE$  by SAS

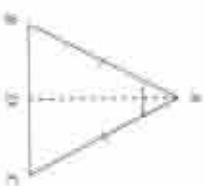
- c.  $\triangle FDE \cong \triangle LDE$  by ASA  
 d.  $\triangle FDE \cong \triangle LDE$  by SAS

8.

38. Supply the reasons missing from the proof shown below.

Given:  $\overline{AD} \cong \overline{AC}$ ,  $\angle BAD \cong \angle CAD$

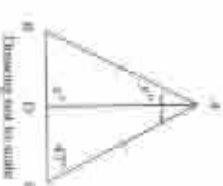
Prove:  $\overline{BD} \cong \overline{BC}$



Statements	Reasons
1. $\overline{AD} \cong \overline{AC}$	1. Given
2. $\angle BAD \cong \angle CAD$	2. Given
3. $\overline{AD} \cong \overline{AD}$	3. Reflexive Property
4. $\triangle BAD \cong \triangle CAD$	4. ?
5. $\overline{BD} \cong \overline{CD}$	5. ?
6. $\overline{BD} \cong \overline{BC}$	6. Def. of segment bisector

- a. SAS, CPCTC  
b. SAS, Reflexive Property  
c. SSS, Reflexive Property  
d. SAS, CPCTC

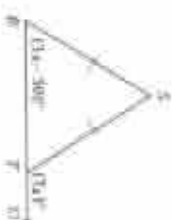
39. Find the values of  $x$  and  $y$ .



- a.  $x = 90$ ,  $y = 47$   
b.  $x = 47$ ,  $y = 47$   
c.  $x = 47$ ,  $y = 43$   
d.  $x = 96$ ,  $y = 43$

9.

40. Find the value of  $x$ . The diagram is not to scale.



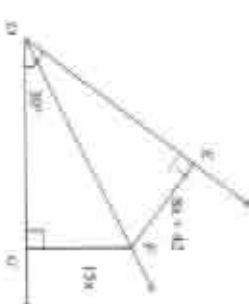
- a.  $x = 21$   
b.  $x = 40$   
c.  $x = 13$   
d. none of these

41. Find the length of the unknown side. The diagram is not to scale.



- a. 24  
b. 49  
c. 82  
d. 84

42. If  $\overline{AD} \cong \overline{BD}$ , find the value of  $x$ . The diagram is not to scale.



- a.  $\frac{23}{42}$   
b. 90  
c. 30  
d. 6

10.

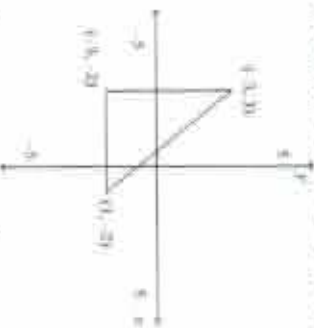
42. Which statement can you conclude is true from the given information?

Given:  $\overline{AB}$  is the perpendicular bisector of  $\overline{JK}$ .



- a.  $\overline{AJ} \cong \overline{BK}$       c.  $\overline{AJ} \cong \overline{JK}$   
 b.  $\angle JAK$  is a right angle.      d.  $\angle J$  is the midpoint of  $\overline{JK}$

44. Find the center of the circle that you can circumscribe about the triangle.



- a.  $(\frac{1}{2}, -1)$       b.  $(-1, \frac{1}{2})$       c.  $(-1, \frac{1}{2})$       d.  $(-1, -2)$

45. Name the point of concurrency of the angle bisectors.



- a.  $\angle$       b.  $\overline{AB}$       c.  $\angle C$       d. not shown

46. Use a triangle. List the respective names of the points of concurrency of

- perpendicular bisectors of the sides
  - bisectors of the angles
  - medians
  - lines containing the altitudes
- |                 |                 |                 |                 |
|-----------------|-----------------|-----------------|-----------------|
| a. circumcenter | b. circumcenter | c. circumcenter | d. circumcenter |
| a. centroid     | b. centroid     | c. centroid     | d. centroid     |
| a. orthocenter  | b. orthocenter  | c. orthocenter  | d. orthocenter  |
| a. incentre     | b. incentre     | c. incentre     | d. incentre     |
| a. incentre     | b. incentre     | c. incentre     | d. incentre     |

47. What is the negation of this statement?

Miguel's team won the game.

- a. It was not Miguel's team that won the game.  
 b. Miguel's team lost the game.  
 c. Miguel's team did not win the game.  
 d. Miguel's team did not play the game.

48. What is the inverse of this statement?

If he speaks Arabic, he can act as the interpreter.

- a. If he does not speak Arabic, he can act as the interpreter.  
 b. If he speaks Arabic, he can't act as the interpreter.  
 c. If he can act as the interpreter, then he does not speak Arabic.  
 d. If he does not speak Arabic, he can't act as the interpreter.

49. Which three lengths can NOT be the lengths of the sides of a triangle?

- a. 21 m, 17 m, 14 m      c. 5 m, 7 m, 8 m  
 b. 11 m, 11 m, 11 m      d. 21 m, 6 m, 11 m

50.  $m\angle A = 56^\circ$ ,  $m\angle B = 73^\circ$ , and  $m\angle C = 28^\circ$ . List the sides of  $\triangle ABC$  in order from shortest to longest.

- a.  $\overline{AB}$ ,  $\overline{BC}$ ,  $\overline{AC}$       b.  $\overline{BC}$ ,  $\overline{AB}$ ,  $\overline{AC}$       c.  $\overline{AC}$ ,  $\overline{AB}$ ,  $\overline{BC}$       d.  $\overline{AB}$ ,  $\overline{AC}$ ,  $\overline{BC}$

51. The Sears Tower in Chicago is 1450 feet high. A model of the tower is 24 inches tall. What is the ratio of the height of the model to the height of the actual Sears Tower?

- a.  $1:725$       b.  $725:1$       c.  $12:725$       d.  $725:12$

52. If  $\frac{x+y}{3} = \frac{y+z}{2}$ , then  $\frac{x}{y} =$

- a.  $y+1$       b.  $\frac{y}{2}$       c.  $\frac{y}{2}$       d.  $y-1$

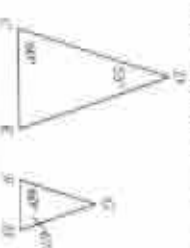


53. Figure 13/85 ~ 86, TJE. Name a pair of corresponding sides.



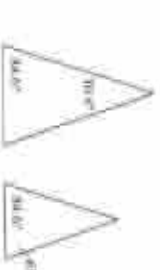
- a.  $\overline{PQ}$  and  $\overline{BE}$       b.  $\overline{PQ}$  and  $\overline{YZ}$       c.  $\overline{QR}$  and  $\overline{BC}$       d.  $\overline{QR}$  and  $\overline{CD}$

54. Write a similarity statement for the triangles.



- a.  $\triangle DFE \sim \triangle FEG$   
b.  $\triangle EDG \sim \triangle FGH$   
c.  $\triangle DFE \sim \triangle FGH$   
d.  $\triangle FDE \sim \triangle FGH$

55. Are the triangles similar? If no, explain why.

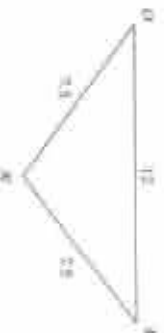


- a. yes, by SAS      b. yes, by SSS      c. yes, by AA      d. no

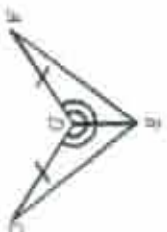
State whether the triangles are similar. If no, write a similarity statement and the postulate or theorem you used.



- a.  $\triangle ABC \sim \triangle DEF$ , SAS  
b.  $\triangle ABC \sim \triangle DEF$ , SAS



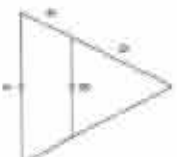
- c.  $\triangle ABC \sim \triangle DEF$ , AA  
d. The triangles are not similar



- a.  $\triangle ABD \sim \triangle BCD$ , SAS  
b.  $\triangle ABD \sim \triangle BCD$ , SAS

- c.  $\triangle ABD \sim \triangle BCD$ , SAS  
d. The triangles are not similar

Explain why the triangles are similar. Then find the value of x.



Then choose an order:

- a. SSS Postulate:  $\frac{6}{10} = \frac{6}{10}$   
b. AA Postulate:  $\frac{6}{10} = \frac{6}{10}$

- c. SAS Postulate:  $\frac{6}{10} = \frac{6}{10}$   
d. AA Postulate:  $\frac{6}{10} = \frac{6}{10}$



99. Use the information in the diagram to determine the height of the tree as the nearest foot.



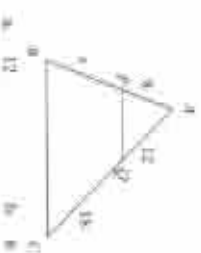
- a. 80 ft      b. 204 ft      c. 60 ft      d. 72 ft

100. Michelle wanted to measure the height of her school's flagpole. She placed a mirror on the ground 48 feet from the flagpole, then walked backwards until she was able to see the top of the pole in the mirror. Her eyes were 5 feet above the ground and she was 12 feet from the mirror. Using similar triangles, find the height of the flagpole to the nearest tenth of a foot.



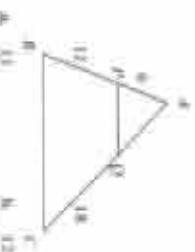
- a. 20 ft      b. 38.4 ft      c. 55 ft      d. 25 ft

101. Use the Side-Splitter Theorem to find  $x$ , given that  $PQ \parallel AC$ .



- a. 12      b. 8      c. 20      d. 24

102. Given  $PQ \parallel AC$ , find the length of  $PQ$ . The diagram is not drawn to scale.



- a. 11      b. 12      c. 18      d. 9

Solve for  $x$ .



- a. 8      b. 12      c. 6      d. 2

104. Find  $x$  to the nearest tenth.



- a. 4 ft      b. 14.4      c. 9.4      d. 1.7

## Geometry Final Exam Review Ch 6-11

## Multiple Choice

Identify the choice that best completes the statement or answers the question.

- 1.
- $ABCD$
- is a parallelogram. If
- $m\angle DAB = 115$
- , then
- $m\angle BCD =$
- \_\_\_\_\_. The diagram is not to scale.



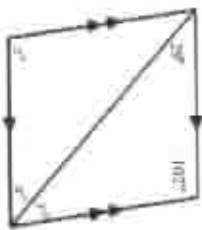
- a. 125      b. 65      c. 75      d. 115

- 2.
- $AA'CC'$
- is a parallelogram. If
- $AA' = x + 1.5$
- and
- $CC' = 3x + 5$
- find the value of
- $x$
- and then find
- $AA'$
- and
- $CC'$
- .



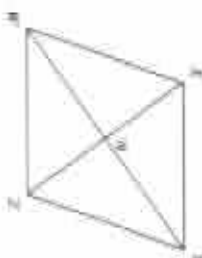
- a.  $x = 7, AA' = 21, CC' = 22$   
 b.  $x = 5, AA' = 20, CC' = 20$   
 c.  $x = 7, AA' = 22, CC' = 22$   
 d.  $x = 5, AA' = 21, CC' = 20$

3. Find the values of the variables in the parallelogram. The diagram is not to scale.



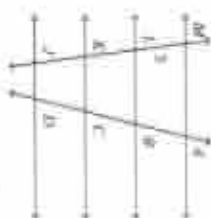
- a.  $x = 89, y = 29, z = 102$   
 b.  $x = 29, y = 89, z = 131$   
 c.  $x = 49, y = 49, z = 131$   
 d.  $x = 29, y = 49, z = 102$

- 4.
- $WXYZ$
- is a parallelogram. Name an angle congruent to
- $\angle WXY$
- .



- a.  $\angle ZYX$       b.  $\angle XWZ$       c.  $\angle ZYW$       d.  $\angle WXY$

5. In the figure, the horizontal lines are parallel and
- $AB = BC = CD$
- . Find
- $AM$
- . The diagram is not to scale.



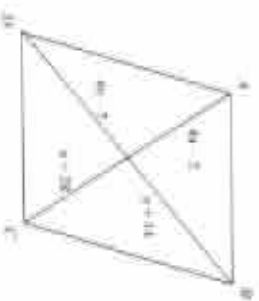
- a. 9      b. 12      c. 6      d. 3

6. Find
- $AM$
- in the parallelogram if
- $PM = 9$
- and
- $AO = 4$
- . The diagram is not to scale.



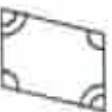
- a. 8      b. 4      c. 9      d. 4.5

7. Find values of  $x$  and  $y$  for which  $ABCD$  must be a parallelogram. The diagram is not to scale.



- a.  $x = 10, y = 38$     b.  $x = 10, y = 23$     c.  $x = 10, y = 7$     d.  $x = 7, y = 19$

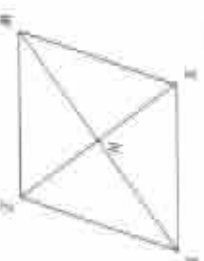
8. Based on the information in the diagram, can you prove that the figure is a parallelogram? Explain.



- a. Yes, opposite sides are congruent.  
b. Yes, opposite angles are congruent.  
c. No, you cannot prove that the quadrilateral is a parallelogram.  
d. Yes, two opposite sides are both parallel and congruent.

9. Based on the information given, can you determine that the quadrilateral must be a parallelogram? Explain.

Given:  $\overline{AT} \cong \overline{WZ}$  and  $\overline{XW} \cong \overline{TZ}$



- a. No, you cannot determine that the quadrilateral is a parallelogram.  
b. Yes, two opposite sides are both parallel and congruent.  
c. Yes, opposite sides are congruent.  
d. Yes, diagonals of a parallelogram bisect each other.

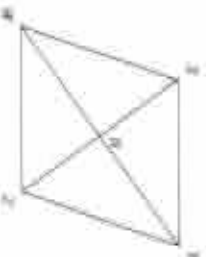
1

10. If  $\angle ONP = 5x - 3$ ,  $\angle MPN = 4x + 4$ ,  $\angle MNP = x - 9$ , and  $\angle PNM = 2y - 5$ , find the values of  $x$  and  $y$  for which  $LMNO$  must be a parallelogram. The diagram is not to scale.



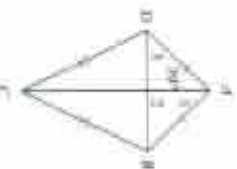
- a.  $x = 0, y = \frac{7}{5}$     c.  $x = 0, y = \frac{5}{2}$   
b.  $x = 0, y = \frac{7}{5}$     d.  $x = 0, y = \frac{5}{2}$

11. Which statement can you use to conclude that quadrilateral  $XYZW$  is a parallelogram?



- a.  $\overline{XW} \cong \overline{YZ}$  and  $\overline{XY} \cong \overline{WZ}$     c.  $\overline{ZO} \cong \overline{OW}$  and  $\overline{XO} \cong \overline{YO}$   
b.  $\overline{XW} \cong \overline{WZ}$  and  $\overline{XY} \cong \overline{WZ}$     d.  $\overline{XW} \cong \overline{YZ}$  and  $\overline{XY} \cong \overline{WZ}$

12. Find  $m\angle 1$  and  $m\angle 2$  on the kite. The diagram is not to scale.

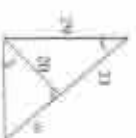


- a.  $31, 51$     b.  $39, 39$     c.  $39, 51$     d.  $51, 39$

2

Solve for  $a$  and  $b$ .

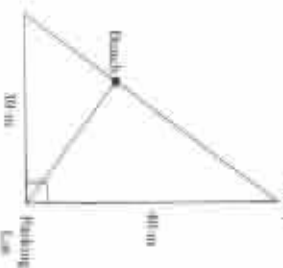
13.



$$\begin{aligned} a &= \frac{400}{21}, b = \frac{500}{21} \\ c &= \frac{21}{21}, b = \frac{29}{21} \\ d &= \frac{20}{21}, b = \frac{500}{21} \end{aligned}$$

14. Kenny wants to walk the shortest distance to get from the parking lot to the bench.

Find the shortest distance.



15. How far to the spot on the bench from the parking lot? Show the work for place on the bench he from the parking lot?

$$\begin{aligned} a &= 24 \text{ m}, 12 \text{ m} \\ b &= 38 \text{ m}, 12 \text{ m} \\ c &= 34 \text{ m}, 18 \text{ m} \\ d &= 24 \text{ m}, 18 \text{ m} \end{aligned}$$

Solve for  $x$ .

15.

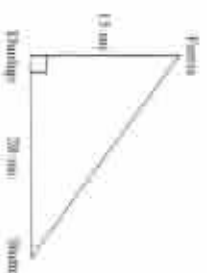


$$\begin{aligned} a &= 2\sqrt{35} \\ b &= 2\sqrt{65} \\ c &= 2\sqrt{5} \\ d &= \sqrt{91} \end{aligned}$$

5.

16. Wayne used the diagram to compute the distance from Ferris to Dooling to Butte. How much shorter is the distance directly from Ferris to Butte than the distance Wayne found?

16.

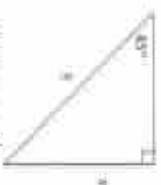


$$\begin{aligned} a &= 20 \text{ mi} \\ b &= 25 \text{ mi} \\ c &= 10 \text{ mi} \\ d &= 35 \text{ mi} \end{aligned}$$

17. A triangle has sides of lengths 12, 14, and 19. Is it a right triangle? Explain.

$$\begin{aligned} a &= \text{yes}, 12^2 + 14^2 = 19^2 \\ b &= \text{no}, 12^2 + 14^2 = 19^2 \\ c &= \text{no}, 12^2 + 14^2 = 19^2 \\ d &= \text{yes}, 12^2 + 14^2 = 19^2 \end{aligned}$$

18. Find the value of the variable. If your answer is not an integer, leave it in simplest radical form.



Find the value of the variable.

$$\begin{aligned} a &= 3\sqrt{2} \\ b &= \frac{5\sqrt{3}}{2} \\ c &= \frac{5\sqrt{2}}{2} \\ d &= 3\sqrt{3} \end{aligned}$$

19. The area of a square garden is 50 sq. How long is the diagonal?

$$\begin{aligned} a &= 25 \text{ m} \\ b &= 100 \text{ m} \\ c &= 3\sqrt{6} \text{ m} \\ d &= 10 \text{ m} \end{aligned}$$

Find the value of the variable. If your answer is not an integer, leave it in simplest radical form.

20.



Find the value of the variable.

$$\begin{aligned} a &= x = 12, y = 14\sqrt{3} \\ b &= x = 12, y = 14\sqrt{3} \\ c &= x = 12, y = 14\sqrt{3} \\ d &= x = 12, y = 14\sqrt{3} \end{aligned}$$

5.

21. Find the value of  $x$  and  $y$  rounded to the nearest tenth.



a.  $x = 48.1, y = 46.4$   
b.  $x = 48.1, y = 179.3$

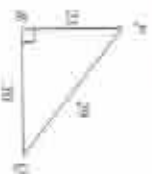
c.  $x = 24.0, y = 179.3$   
d.  $x = 38.0, y = 46.4$

22. A piece of art is in the shape of an equilateral triangle with sides of 7 in. Find the area of the piece of art. Round your answer to the nearest tenth.

a. none of these b.  $42.4 \text{ in}^2$

c.  $17.3 \text{ in}^2$  d.  $21.7 \text{ in}^2$

23. Write the tangent ratios for  $\angle P$  and  $\angle Q$ .



Not drawn to scale

a.  $\tan P = \frac{29}{21}, \tan Q = \frac{21}{29}$   
b.  $\tan P = \frac{29}{21}, \tan Q = \frac{21}{29}$

c.  $\tan P = \frac{21}{29}, \tan Q = \frac{29}{21}$   
d.  $\tan P = \frac{28}{29}, \tan Q = \frac{29}{28}$

Find the value of  $x$  in the nearest degree.

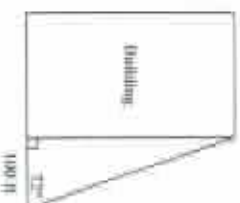


Not drawn to scale

a. 30° b. 60°

c. 70° d. 85°

24. The students in Mr. Callie's class used a surveyor's measuring device to find the angle from their location to the top of a building. They also measured their distance from the bottom of the building. The diagram shows the angle measure and the distance. To the nearest foot, find the height of the building.



a. 2400 ft b. 72 ft

c. 100 ft d. 33 ft

25. A large radio pole is in the state of Washington is 100 feet tall. At a particular time of day, the shadow casts a 249-foot-long shadow. Find the measure of  $\angle A$  to the nearest degree.



a.  $68^\circ$  b.  $45^\circ$

c.  $35^\circ$  d.  $22^\circ$

26. Find the missing value to the nearest tenth.

$\cos B = 45$

a.  $88.7^\circ$  b.  $77.8^\circ$

c.  $49.8^\circ$  d.  $67.8^\circ$

27. Write the ratios for  $\sin A$  and  $\cos A$ .



a.  $\sin A = \frac{\sqrt{119}}{13}, \cos A = \frac{5}{\sqrt{119}}$

c.  $\sin A = \frac{\sqrt{119}}{12}, \cos A = \frac{5}{12}$

b.  $\sin A = \frac{\sqrt{119}}{13}, \cos A = 5$

d.  $\sin A = \frac{5}{\sqrt{119}}, \cos A = \frac{\sqrt{119}}{5}$

Find the value of  $x$ . Round to the nearest tenth.

28.



Not drawn to scale.

- a. 12.5      b. 10      c. 13      d. 9.7

29.



Not drawn to scale.

- a. 12.9      b. 8.5      c. 12.4      d. 8.1

30.



Not drawn to scale.

- a. 51.6      b. 52.9      c. 61.2      d. 61.5

Find the value of  $x$ . Round to the nearest degree.

31.



Not drawn to scale.

- a. 62      b. 25.5      c. 28      d. 25

9

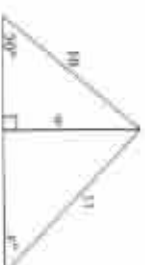
33.



Not drawn to scale.

- a. 41      b. 36      c. 46      d. 44

34. Find the value of  $w$  and then  $x$ . Round lengths to the nearest tenth and angle measures to the nearest degree.



- a.  $w = 7.7, x = 8.6$       c.  $w = 7.7, x = 5.9$   
b.  $w = 8.6, x = 3.8$       d.  $w = 8.6, x = 4.4$

Find the value of  $x$ . Round the length to the nearest tenth.

35.



Not drawn to scale.

- a. 7.1 cm      b. 13.1 cm      c. 9.2 cm      d. 8.4 cm

36. An airplane over the Pacific sights an aircraft carrier at an angle of depression of  $3^\circ$ . At the same time, the horizontal distance from the airplane to the carrier is 8629 meters. What is the height of the plane to the nearest meter?



Not drawn to scale.

- a. 401 m      b. 405 m      c. 4611 m      d. 4647 m

10

37. To approach the runway, a small plane must begin a  $9^\circ$  descent starting from a height of 1,125 feet above the ground. To the nearest tenth of a mile, how many miles from the runway is the airplane at the start of this approach?



Not drawn to scale

- a. 1.3 mi      b. 1.4 mi      c. 0.2 mi      d. 7,494.5 mi

In the diagram, the dashed figure is the image of the solid figure.



38. Name the image of  $\angle E$ .  
a.  $\angle F$       b.  $\angle Q$       c.  $\angle P$       d.  $\angle R$
39. Name the image of  $\overline{HE}$ .  
a.  $\overline{PQ}$       b.  $\overline{RS}$       c.  $\overline{DE}$       d.  $\overline{FV}$
40. The vertices of a triangle are  $P(-3, 8)$ ,  $Q(-6, -4)$ , and  $R(1, 1)$ . Name the vertices of the image reflected in the  $y$ -axis.  
a.  $P'(3, 8)$ ,  $Q'(6, -4)$ ,  $R'(1, 1)$       c.  $P'(-3, -8)$ ,  $Q'(-6, -4)$ ,  $R'(-1, 1)$   
b.  $P'(-3, 8)$ ,  $Q'(-6, -4)$ ,  $R'(1, 1)$       d.  $P'(3, -8)$ ,  $Q'(6, -4)$ ,  $R'(1, -1)$
41. Use an ordered pair to describe the translation that is 4 units to the right and 6 units down.  
a.  $\{(x, y) \rightarrow (x+4, y-6)\}$       b.  $\{(x, y) \rightarrow (x-4, y-6)\}$       c.  $\{(x, y) \rightarrow (x+4, y+6)\}$       d.  $\{(x, y) \rightarrow (x-4, y+6)\}$
42. Write a rule to describe the transformation that is a reflection in the  $x$ -axis.  
a.  $(x, y) \rightarrow (x, -y)$       b.  $(x, y) \rightarrow (-x, -y)$   
c.  $(x, y) \rightarrow (-x, y)$       d.  $(x, y) \rightarrow (x, y)$

Find the area. The figure is not drawn to scale.



- a. 1,100 in.<sup>2</sup>      b. 60 in.<sup>2</sup>      c. 138 in.<sup>2</sup>      d. 1,440 in.<sup>2</sup>



- a. 344.5 cm<sup>2</sup>      b. 127 cm<sup>2</sup>      c. 172 cm<sup>2</sup>      d. 50 cm<sup>2</sup>



- a. 90 ft<sup>2</sup>      b. 207 m<sup>2</sup>      c. 103.6 m<sup>2</sup>      d. 77.2 m<sup>2</sup>

46. The area of a parallelogram is 420 cm<sup>2</sup> and the height is 35 cm. Find the corresponding base.  
a. 385 cm      b. 435 cm      c. 14,700 cm<sup>2</sup>      d. 12 cm

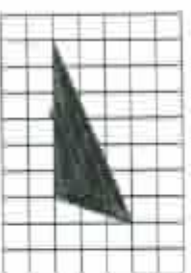
47. Find the value of  $x$  in the parallelogram.



- Not drawn to scale  
a. 12      b. 20      c. 40.3      d. 35



48. A flip bucket at random at a point on the grid. Find the probability of the flip landing on the figure.



- a.  $\frac{9}{35}$       b.  $\frac{9}{70}$       c.  $\frac{18}{70}$       d.  $\frac{9}{35}$

Find the area of the trapezoid. Leave your answer in simplest radical form.

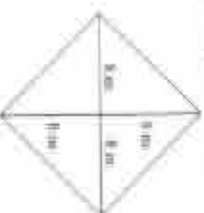
49.



Not drawn to scale

- a.  $6\sqrt{2}$   $\text{cm}^2$       b.  $70\text{ cm}^2$       c.  $24\sqrt{2}$   $\text{cm}^2$       d.  $4\text{ cm}^2$   
 50. A kite has diagonals 9.2 ft and 8 ft. What is the area of the kite?  
 a. 29.6  $\text{ft}^2$       b. 36.8  $\text{ft}^2$       c. 73.6  $\text{ft}^2$       d. 36.8  $\text{ft}^2$

51. Find the area of the rhombus.



- a.  $12\text{ m}^2$       b.  $40\text{ m}^2$       c.  $128\text{ m}^2$       d.  $22\text{ m}^2$   
 52. Find the area of a regular hexagon with an apothem 10.5 feet long and a side 19 feet long. Round your answer to the nearest tenth.  
 a.  $156.3\text{ ft}^2$       b.  $625.3\text{ ft}^2$       c.  $1875.8\text{ ft}^2$       d.  $937.9\text{ ft}^2$

13

53. Find the area of an equilateral triangle with side 12.

- a.  $36\sqrt{3}$       b. 72      c. 36      d.  $3\sqrt{3}$

Find the area of the regular polygons. Give the answer to the nearest tenth.

54. square with radius 16 ft

- a.  $512\text{ ft}^2$       b.  $312\text{ ft}^2$       c.  $256\text{ ft}^2$       d.  $1024\text{ ft}^2$

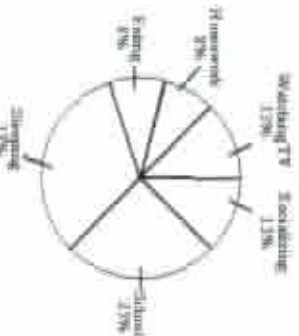
55. hexagon with radius 5 in

- a.  $259.8\text{ in}^2$       b.  $129.9\text{ in}^2$       c.  $65.4\text{ in}^2$       d.  $33.0\text{ in}^2$

56. Grade 7 students were surveyed to describe how many hours a day they spend on various activities. The results are shown in the circle graph below. Find the measure of each central angle in the circle graph.

- a. Sleeping  
 b. Eating

### How Students Spend Their Time



- a.  $118.8^\circ$ ,  $28.8^\circ$       b.  $108^\circ$ ,  $28.8^\circ$       c.  $118.8^\circ$ ,  $28.8^\circ$       d.  $58.4^\circ$ ,  $28.8^\circ$

57. The circumference of a circle is 60 ft. Find the diameter, the radius, and the length of an arc of  $140^\circ$ .

- a. 60 ft; 30 ft; 27.3 ft  
 b. 60 ft; 30 ft; 11.7 ft  
 c. 120 ft; 30 ft; 160 ft  
 d. 30 ft; 60 ft; 11.7 ft

14

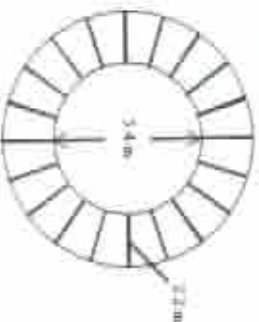
58. Find the length of arc  $XY$ , leaving your answer in terms of  $\pi$ .



- a.  $24\pi$  m      b.  $12\pi$  m      c.  $4\pi$  m      d.  $720\pi$  m

Find the area of the circle. Leave your answer in terms of  $\pi$ .

59. The figure represents the overhead view of a deck surrounding a hot tub. What is the area of the deck? Round to the nearest tenth.



- a.  $75.9 \text{ m}^2$       b.  $89.8 \text{ m}^2$       c.  $278.7 \text{ m}^2$       d.  $22.9 \text{ m}^2$

60. Find the area of the figure to the nearest tenth.



- a.  $74.2 \text{ m}^2$       b.  $8.7 \text{ in}^2$       c.  $148.4 \text{ in}^2$       d.  $23.6 \text{ in}^2$

61. Find the area of a sector with a central angle of  $180^\circ$  and a diameter of 5.6 cm. Round to the nearest tenth.

- a.  $49.2 \text{ cm}^2$       b.  $12.5 \text{ cm}^2$       c.  $22 \text{ cm}^2$       d.  $5.6 \text{ cm}^2$

62. Find the exact area of the shaded region.



- a.  $(192\pi - 144)\text{m}^2$       c.  $[8\pi - 144\sqrt{3}]\text{m}^2$

- b.  $[192\pi - 144\sqrt{3}]\text{m}^2$       d. none of these

63. Kenny's favorite radio station has this schedule: news 17 min, commercial 2 min, music 41 min. If Kenny chooses a time of day at random to turn on the radio to his favorite station, what is the probability that the news will be on?

- a.  $\frac{13}{43}$       b.  $\frac{2}{4}$       c.  $\frac{1}{39}$       d.  $\frac{13}{60}$

64. What is the probability that a point chosen at random on the grid will lie in the shaded region?



- a.  $\frac{5}{8}$       b.  $\frac{2}{5}$       c.  $\frac{3}{8}$       d.  $\frac{3}{5}$

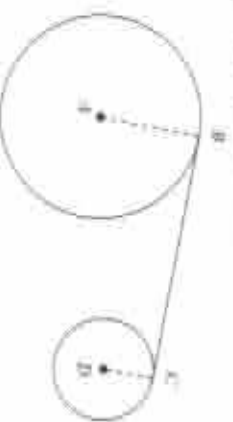
Assume that lines that appear to be tangent are tangent.  $O$  is the center of the circle. Find the value of  $x$ . (Figures are not drawn to scale.)

85.  $m\angle P = 12$



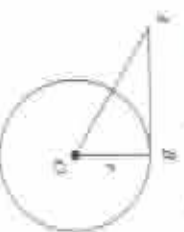
- a. 78      b. 39      c. 102      d. 28

86.  $\overline{PR}$  is tangent to circle  $A$  at  $R$  and to circle  $B$  at  $T$  (not drawn to scale).  $AR = 7$ ,  $BC = 18$ , and  $EC = 5$ . Find  $AE$  to the nearest tenth.



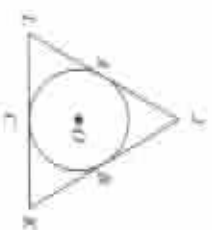
- a. 18.7      b. 18.1      c. 21.8      d. 19.3

87.  $\overline{AB}$  is tangent to circle  $E$  at  $B$ . Find the length of the radius  $r$  for  $AE = 5$  and  $AO = 8.6$ . Round to the nearest tenth if necessary. The diagram is not to scale.



- a. 9.9      b. 7      c. 13      d. 3.6

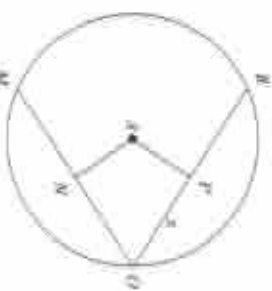
88.  $\overline{AK}$ ,  $\overline{AL}$ , and  $\overline{LJ}$  are all tangent to  $\odot O$  (not drawn to scale).  $AE = 9$ ,  $AL = 10$ , and  $CK = 14$ . Find the perimeter of  $\triangle KJL$ .



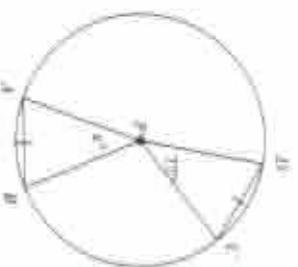
- a. 60      b. 18      c. 46      d. 33

Find the value of  $x$ . If necessary, round your answer to the nearest tenth. The figure is not drawn to scale.

89.  $MA \cong PA$ ,  $MO \perp NA$ ,  $MO \perp PA$ ,  $MO = 6$  ft.

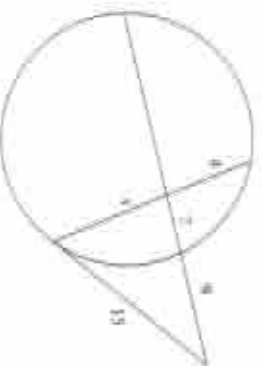


- a. 12 ft      b. 36 ft      c. 6 ft      d. 3 ft



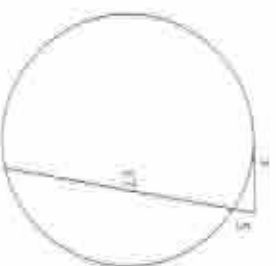
- a. 13      b. 26      c. 77      d. 38.5

71. The measure of a chord, a secant and a tangent to the circle. Round to the nearest hundredth, if necessary.



- a. 15.75      b. 31      c. 31.4      d. 28

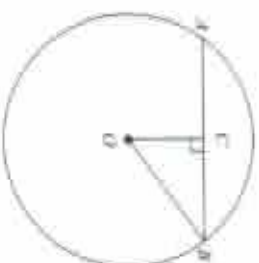
72.



- a. 10.34      b. 10.49      c. 118      d. 9.22

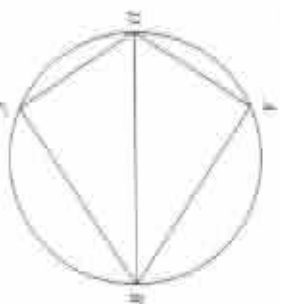
73.

72. The radius of circle  $O$  is 18, and  $OC = 11$ . Find  $AB$ . Round to the nearest tenth, if necessary. (The figure is not drawn to scale.)



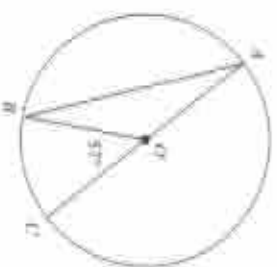
- a. 12.4      b. 3.8      c. 24.9      d. 44.4

73. Given that  $\angle JAB$  and  $\angle JCB$  are right angles and  $m\angle BDC = 41^\circ$ , what is the measure of arc  $AC$ ? (The figure is not drawn to scale.)



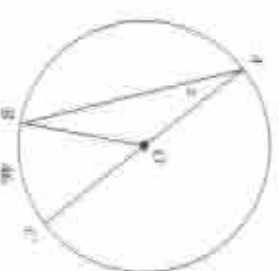
- a. 164      b. 103      c. 146      d. 202

75. Find the measure of  $\angle BAC$ . (The figure is not drawn to scale.)



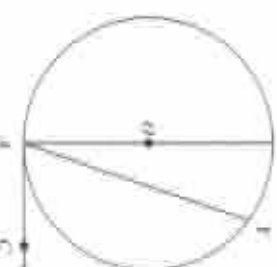
- a. 57      b. 28.5      c. 33      d. 114

76. Find  $x$ . (The figure is not drawn to scale.)



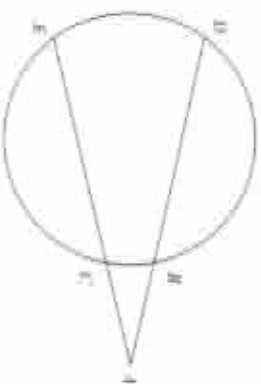
- a. 92      b. 44      c. 22      d. 46

77. If  $m\angle BTF = 40$ , what is  $m\angle BCF$ ? (The figure is not drawn to scale.)



- a. 140      b. 100      c. 70      d. 30

78.  $m\angle EBY = 96$  and  $m\angle DCY = 67$ . Find  $m\angle A$ . (The figure is not drawn to scale.)



- a. 14.5      b. 62.5      c. 81.5      d. 29

Write the standard equation for the circle.

79. center  $(2, -3)$ ,  $r = 4$

a.  $(x - 2)^2 + (y - 3)^2 = 16$       c.  $(x - 2)^2 + (y - 3)^2 = 36$

b.  $(x - 2)^2 + (y - 3)^2 = 4$       d.  $(x + 2)^2 + (y + 3)^2 = 4$

80. center  $(-6, -8)$ , that passes through  $(0, 0)$

a.  $(x - 6)^2 + (y - 8)^2 = 10$       c.  $(x + 6)^2 + (y + 8)^2 = 14$

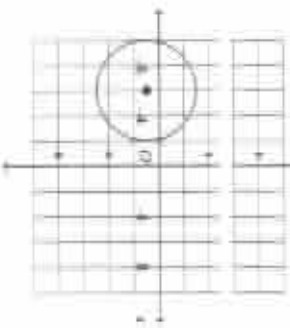
b.  $(x - 6)^2 + (y - 8)^2 = 196$       d.  $(x + 6)^2 + (y + 8)^2 = 100$

81. Find the center and radius of the circle with equation  $(x + 4)^2 + (y + 3)^2 = 64$

a. center  $(-4, 3)$ ,  $r = 8$       c. center  $(-4, -3)$ ,  $r = 64$

b. center  $(4, 3)$ ,  $r = 64$       d. center  $(4, -3)$ ,  $r = 8$

12. A low-voltage radio station can be heard only within a certain distance from the station. On the graph below, the circular region represents that part of the city where the station can be heard, and the center of the circle represents the location of the station. Which equation represents the boundary for the region where the station can be heard?



- a.  $(x - 4)^2 + (y - 3)^2 = 32$   
 b.  $(x + 4)^2 + (y + 3)^2 = 32$   
 c.  $(x - 4)^2 + (y - 3)^2 = 16$   
 d.  $(x + 4)^2 + (y + 3)^2 = 16$